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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70) **Rec'd PCT/PTO 12 OCT 2004**

Applicant's or agent's file reference PCT0087	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/KR2002/000617	International filing date (day/month/year) 09 APRIL 2002 (09.04.2002)	Priority date (day/month/year)
International Patent Classification (IPC) or national classification and IPC IPC7 C12P 1/00		
Applicant GENOFOCUS CO., LTD. et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
 These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the report
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 10 NOVEMBER 2003 (10.11.2003)	Date of completion of this report 30 JULY 2004 (30.07.2004)
Name and mailing address of the IPEA/KR Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer WON, Jong Hyeok Telephone No. 82-42-481-5592 <div style="text-align: right;"> </div>

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/KR2002/000617

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☒ the description:
 pages 1-45, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the claims:
 pages 46-57, as originally filed
 pages _____, as amended (together with any statement) under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☒ the drawings:
 pages 1/12- 12/12, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language English which is

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet _____

5.

- ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed." and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION

International application No.

PCT/KR2002/000617

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims	1-56	YES
	Claims	None	NO
Inventive step (IS)	Claims	1-56	YES
	Claims	None	NO
Industrial applicability (IA)	Claims	1-56	YES
	Claims	None	NO

2. Citations and explanations (Rule 70.7)**1) Reference is made to the following documents identified in the International Search Report:**

D1: J. of Bacteriology, Vol. 183, No. 21, pages 6294-6301 (2001)

D2: WO 02-00232 A

D3: WO 01-12817 A

2) D1 discloses the surface display system based on the use of bacterial spores. A protein of the *Bacillus subtilis* spore coat was found to be located on the spore surface and used as fusion partner to express the amino acid terminal fragment of the tetanus toxin.

D2 discloses the method for modulation of an immune response of an organism comprising contacting organism with a spore system and comprising a recombinant spore having at least one exogenous nucleic acid, peptide, or polypeptide. In this invention, the nucleic acid, peptide, or polypeptide is displayed on or bound to a surface of the spore.

D3 discloses the libraries of recombinant enzymes that are useful for biocatalytic synthesis of derivatives of organic molecules. The use of recombinant enzyme libraries enables to obtain enzymes that catalyze the formation of organic molecule derivatives.

3) The subject-matter of Claim 1 to Claim 2 differs from the process of the closest prior art, which is defined by D1, in the use of a biocatalyst which comprises the steps of preparing a vector for spore surface display comprising a gene construct containing a gene encoding a display motif and a gene encoding the biocatalyst. And none of the cited prior art discloses the biocatalyst according to Claim 29 and Claim 30 which fused covalently to a display motif or displayed on virus surface by virtue of noncovalent bonds.

The prior art provides surface display of recombinant proteins on microbial organism spores. The biocatalyst described in the prior art cannot be continuously reused and applied to various bioconversion reactions because many problems such as cell disruption, inactivation of biocatalyst due to protease may occur during bioconversion reaction.

Meanwhile, the method of Claim 1 to Claim 2 using the stabilized biocatalyst according to Claim 29 to Claim 30 displayed on the surface of virus allows to reuse continuously for a long time and to have various resistance to extreme environment and to be applicable to various bioconversion reactions.

As a consequence, the subject-matter of Claim 1 to 2 and Claim 29 to 30 and its dependent Claim 3 to 28 and 31 to 56 is novel and inventive over the cited prior art. Therefore, the subject-matter of Claims 1 to 56 would appear to meet the requirements of Article 33(2) and 33(3) PCT.

4) It would appear that the claimed subject-matter is industrially applicable.

Therefore, the subject-matter of Claims 1 to 56 meets the requirements of Article 33(4) PCT.